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UNITED STATES DEPARTMENT OF AGRICULTURE

CARPET GRASS



CARPET GRASS is the most important grass for permanent pasture in the Coastal Plain area of the South.

Carpet grass is not a native grass, but was accidentally introduced from tropical America before 1830 and has spread generally over the Southern States.

Carpet grass requires a moist or at least not droughty soil and succeeds better in such soils if sandy than any other pasture grass. The minimum temperature it will survive is about 10° F.

Carpet-grass pastures are readily established in tilled land by seeding at any time from early spring to late summer on a well-firmed seed bed, when moisture conditions are favorable. On unbroken or stump land good results can be secured by burning or mowing the tall native grasses, seeding at a favorable time, and then pasturing to keep the native bunch grasses constantly short. Under this treatment the native grasses are eradicated in one or two years and replaced by a pure stand of carpet grass.

The carrying capacity of good carpet-grass pasture is one cow to the acre for the five best months and one cow to 2 acres for three to five months longer.

Dallis grass, lespedeza, white clover, bur clover, black medic, and Augusta vetch are desirable in mixture with carpet grass. Italian rye may be used as a winter mixture, but needs to be sown each fall. Under some conditions redtop should be used to precede carpet grass.

Carpet-grass pastures should be grazed to their capacity, as under heavy grazing the best condition is maintained.

Bitterweed and dog fennel are the only two weeds that seriously invade carpet-grass pastures. During the first two seasons these weeds should be mowed before they ripen seeds. Thereafter they will cause but little trouble, but mowing should be resorted to when necessary.

Seed of carpet grass is easily harvested by mowing and thrashing. Large areas of pure or nearly pure carpet grass occur in several regions in the South.

Up to the present the quantity of seed produced has been only a fraction of that required. A comprehensive plan has been devised to increase greatly the harvesting of seed, as the outstanding need to stimulate a much greater use of carpet grass for pasture is an ample seed supply.

Contribution from the Bureau of Plant Industry

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Washington, D. C.

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CARPET GRASS.

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CONTENTS.

	Page.		Page.
Value of carpet grass-----	3	Carrying capacity-----	9
Description-----	4	Other grasses to grow in mixture	
History-----	5	with carpet grass-----	10
Soil and moisture relations-----	7	Seed crop-----	11
Temperature adaptations-----	7	Harvesting the seed-----	12
Establishing carpet-grass pastures--	7	Cleaning the seed-----	12
Weeds-----	9		

VALUE OF CARPET GRASS.

CARPET GRASS, also known as Louisiana grass and by the French inhabitants of that State as *petit gazon*, is the most valuable grass known for permanent pastures on the sandy soils of the southern Coastal Plain region of the United States. Although long since introduced into the country, its high value has been unappreciated. The reasons for this are not clear, but may be ascribed partly at least to the fact that until very recent years improved pastures in the South were not properly appreciated. Furthermore, carpet grass has been confused with several other more or less similar grasses, and in the belief that it was a native grass has been left like the others to shift for itself.

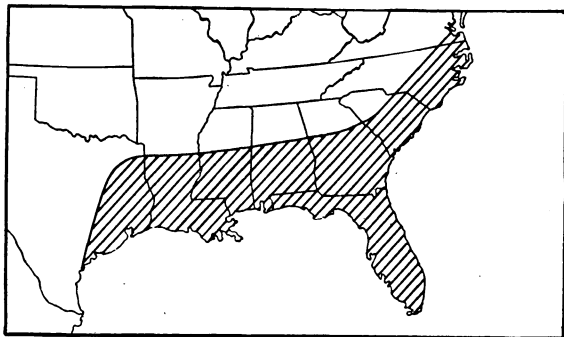


FIG. 1.—Map of the southern United States, showing the distribution of carpet grass.

Extensive observations on carpet grass and the data derived from careful farmers who had learned from experience the value of this grass lead to the conclusion that under conditions suitable for its growth it is at least equal to Bermuda grass in carrying capacity and feeding value and will thrive on soils where Bermuda grass can be made to succeed only by the use of fertilizers.

It is estimated that at least one-third of the Coastal Plain area of the Southern States will grow excellent carpet grass (fig. 1). Fur-

thermore, by the use of this grass most of this area can be developed into admirable permanent pastures without removing the stumps from the land. Land thus improved will support many times the live stock that now exist on the native ranges.

The natural grasses of the Coastal Plain do not furnish good pasturage. They are mainly broom sedge (various species of *Andropogon*) and wire-grass (a name indiscriminately applied to several wiry, slender-leaved, tough grasses, the most widespread of which is *Aristida gracilis*). These grasses are burned off nearly every winter when dry. From early spring to midsummer the young growth furnishes very good pasturage, from midsummer till frost the animals gain slowly if at all, but from frost until the following spring they become greatly emaciated. Much of this very poor natural pasturage can be replaced cheaply by excellent high-grade pastures with carpet grass as the basis. For this purpose carpet grass is of outstanding importance.

Probably carpet grass has not invaded the open ranges of the Coastal Plain to a greater extent mainly because of light grazing and annual fires. Light grazing permits a large growth of tall native grasses which by shading prevent any vigorous growth of carpet grass, and, when burned, make so strong a fire that all carpet-grass plants are destroyed.

DESCRIPTION.

Carpet grass (fig. 2) is a perennial pale-green grass, spreading by creeping stems which root at every joint, thus forming a close, compact turf. The stems and sheaths are compressed and thus two edged, and this character taken with the blunt leaf tips will distinguish carpet grass from most others (fig. 3). The seed stems are very slender, two or three jointed, and 12 to 24 inches high. Very often two flowering branches arise from the sheath of each stem leaf. Each stem bears two or three, rarely four or five, slender spikes of flowers, which later form very small seeds. Flowering stems are produced almost continuously from early spring until frost in the fall.

Young plants begin their growth in a more or less circular small patch and quickly send out runners in all directions. Under favorable conditions, when without competition from other plants, a single plant in a single season will spread so as to form a circle 2 or 3 feet in diameter and produce abundant flowering stems.

Carpet grass never becomes troublesome as a weed, and when its eradication is desirable it is very easily destroyed by plowing it under.

HISTORY.¹

Carpet grass was probably first recorded from Jamaica by Sloane in 1696. Previous to 1830 it is recorded from Peru, Chile, Brazil, Mexico, Haiti, San Domingo, and Porto Rico. More recent collections show it to be native throughout the West Indies and from Mexico southward to Argentina and Chile. In the United States its present distribution is shown on the map (fig. 1). The oldest specimen from the United States is apparently one collected by Drummond at New Orleans in 1832. An earlier record by Rafinesque is clearly based on a misidentification, as his grass was 6 feet tall. The next older specimen was not collected until 1869. It was not found by Elliott around Charleston, S. C.,

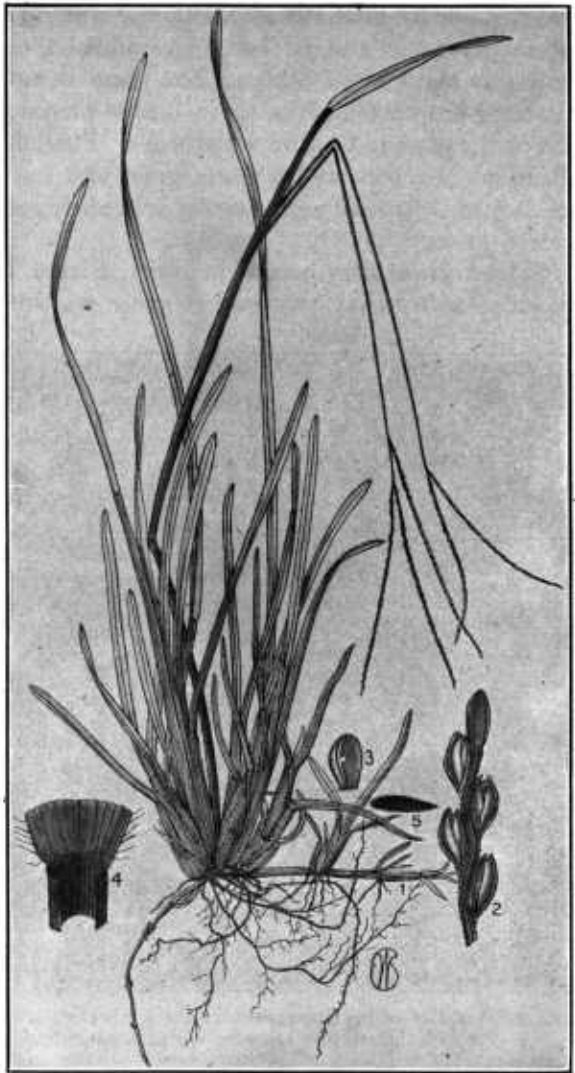


FIG. 2.—Carpet grass (*Axonopus compressus*): 1, A plant with nearly mature seeds, the upper part of the stems bent downward; 2, a portion of a spike enlarged; 3, a mature fruit enlarged; 4, the junction of the sheath and blade, showing the eyelashlike ligule; 5, a cross section of the stem, showing how it is compressed.

¹ This grass was first named by Swartz in 1788 from Jamaica as *Milium compressum*; from South America in 1791 by Lamareck as *Paspalum tristachyon*; from Porto Rico by Poiret in 1804 as *Paspalum platycaule*; and from Tropical America by Flügge in 1810. The three plants are indistinguishable. In the older literature it appears commonly as *Paspalum compressum* (Swartz) Nees. The name now used by most botanists is *Axonopus compressus* (Swartz) Schlechtendahl, but some authorities use *Anastrophus compressus* (Swartz) Beauvois. All of these names refer to one and the same grass.

in 1821, nor by Michaux in North Carolina in 1803. A careful study of carpet grass and its behavior indicates clearly that it is not a native in the United States. The plant is never found remote from civilized habitations even in favorable places where annual fires can not be the explanation for its absence. Furthermore, like other introduced plants, such as Bermuda grass and lespedeza (Japan clover), its ability to spread aggressively is a phenomenon rarely found in a native grass.

Carpet grass also occurs in Java, Sierra Leone, and Singapore. It seems safe to say that carpet grass was introduced in the United



FIG. 3.—A sod of carpet grass, showing the compressed stem and broad leaf tips. These characters are very useful in identifying the grass.

States at New Orleans about 1830 and by 1880 was widespread in the Southern States, occurring at that date in Louisiana, Texas, and Florida.

Previous to 1890 carpet grass was known as Louisiana grass, but since then the name carpet grass has become general. Among the Creoles the name *petit gazon* is in frequent use. Unfortunately, the name carpet grass is also applied, especially in Florida, to any broad-leaved grass, such as various native species of *Paspalum*, but the true carpet grass can readily be distinguished by the blunt leaf tips and compressed stems.

SOIL AND MOISTURE RELATIONS.

Carpet grass will thrive on any type of soil if the moisture conditions be favorable, but, like other plants, it grows better on rich than on poor soils. It is remarkable, however, for its ability to grow on poor sandy soils, thriving under such conditions far better than does Bermuda grass. Even on many alluvial soils, as in the lower Mississippi Valley, carpet grass will gradually crowd out Bermuda grass. The latter, however, will grow under more droughty conditions than will carpet grass. Where the ground-water level is only a few inches from the surface carpet grass grows luxuriantly, but it is equally good on well-drained hilly lands with a clay subsoil that prevents their becoming too dry. The ideal condition for carpet grass is a water table only 1 or 2 feet below the surface. Large areas of such lands make up the so-called flatwoods. Carpet grass is not injured by ordinary floods, but quickly renews growth when the water subsides. Thorough compaction of the soil seems very important for carpet grass, and it is rarely found growing where the soil is loose.

Carpet grass seems entirely indifferent to lime, growing equally as well on "acid" soils as it does along the borders of shell roads. Actual field tests have shown no noticeable result from the use of lime.

TEMPERATURE ADAPTATIONS.

Carpet grass is of tropical origin. Its northern limits indicate that it can rarely survive a winter temperature lower than about 10° F. It certainly will not withstand conditions so far north as does Bermuda grass, probably because all of its stems are above ground, and Bermuda grass possesses underground stems that are protected. On the other hand, the leaves of carpet grass are not injured by frosts that completely kill the leaves of Bermuda grass, and furthermore carpet grass greens up in mild winter weather much more than does Bermuda grass. For these reasons carpet grass may be grazed considerably later in the fall and earlier in the spring.

ESTABLISHING CARPET-GRASS PASTURES.

On cultivated land, carpet grass succeeds best on a well-firmed seed bed. The seed may be sown any time from early spring till after midsummer when the moisture conditions are favorable. To secure a full stand of the grass promptly, seed should be sown at the rate of 10 pounds per acre. A method of seeding that has often been used is to cut grass with mature seed and scatter the hay over the land where it was desired to establish carpet-grass pasture. Many writers have advocated planting the grass vegetatively as Bermuda grass

is propagated, but the expense of this method has discouraged its employment.

It is frequently desirable to establish carpet-grass pasture in open forests or on cut-over land, without going to the expense of clearing. To do this all the standing trees should be deadened by girdling. The land to be seeded should be burned over in winter in order to remove all the tall straw of broom sedge, wire-grass, and other bunch grasses. Plowing or disking is not necessary, and the available evidence does not indicate that it is desirable. As soon as the native grasses begin to grow, animals should be put on the area in sufficient numbers to keep the grass eaten short. Carpet grass at the rate of 5 pounds per acre may then be sown at any time after the weather becomes warm, but preferably when there is ample moisture. Under close grazing most of the native bunch grasses will be killed by the end of the first season and carpet grass will occupy the land. It is not advisable to seed carpet grass indiscriminately on cut-over land. To get good carpet-grass pasture on such lands the rate of grazing must be under control, so that it will be heavy enough to destroy the broom sedge and wire-grass while the carpet grass is getting established. Practically all bunch grasses may be destroyed by continuous heavy grazing, but creeping grasses are not materially injured by such treatment. The trampling incidental to heavy grazing seems also to be an important element in securing good carpet-grass pasture. If lespedeza (Japan clover) is not already on the land it should also be sown, as it succeeds well if mixed with carpet grass. The general plan of converting broom-sedge and wire-grass lands to carpet-grass pastures may thus be summarized:

(1) All brush should be cut and all trees not valuable for timber deadened by girdling.

(2) Burn over the area as cleanly as possible when conditions are favorable. Disking or plowing is not necessary and apparently not desirable. In lieu of burning, close mowing may be used, but this is more expensive.

(3) Limit the area, preferably by fencing, to the acreage that can be kept heavily grazed.

(4) Seed to carpet grass at the rate of 5 to 10 pounds per acre any time after spring weather has begun and moisture conditions are favorable. If not already present, lespedeza should be seeded at the rate of 5 pounds per acre.

(5) Drain by open ditches all areas where water is likely to stand for a considerable time.

(6) Heavy grazing will destroy all bunch grasses in one or at most two seasons, and solid carpet-grass sod will cover the land.

(7) On "flatwoods" and other soils well suited to carpet grass, gallberry¹ and bayberry² often occupy much land. These shrubs may be eradicated by cutting with a brush hook or other device two or three times. Gallberry and bayberry are both so bitter that animals refuse to eat them.

¹ *Ilex glabra*.

² *Myrica* sp.

WEEDS.

Two native weeds in particular, namely bitterweed (*Helenium tenuifolium*) and fennel or Yankee weed (*Eupatorium capillifolium*), are very likely to invade carpet-grass pastures. (Fig. 4.) These weeds should be mowed at least once a season, before they have formed seeds. This is sometimes difficult to accomplish on stump land, and therefore the removal of stumps as promptly as possible is desirable. Goats will keep down fennel to a considerable extent. After two or three seasons further mowing will be unnecessary.

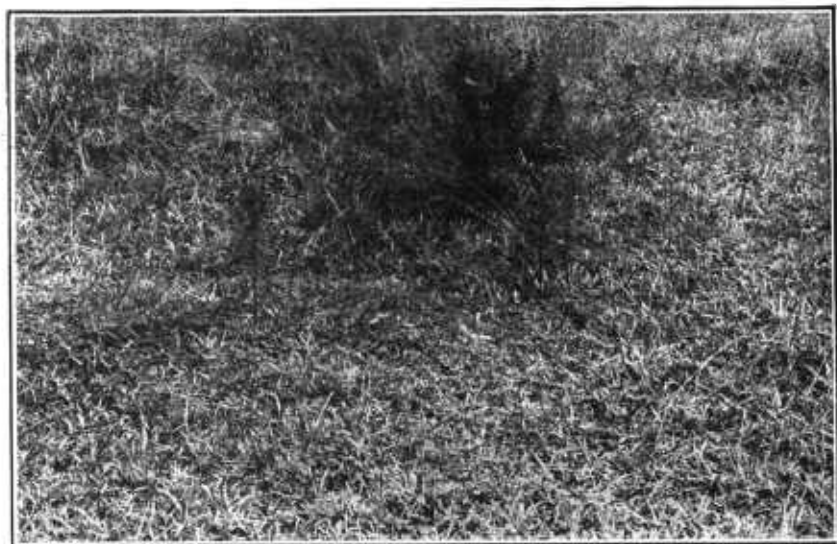


FIG. 4.—The bitterweed shown in the photograph is one of the few weeds that invade carpet-grass pasture. Weeds should be mown before they form seed.

CARRYING CAPACITY.

Good carpet-grass pasture on the evidence available seems little, if any, inferior in value to bluegrass pasture. The experience of careful farmers indicates that the best carpet-grass pasture will furnish grazing for one cow to the acre for about five months each season and for one cow to 2 acres for three or four months longer.

Close grazing is very essential to maintain the grass in the best condition. The trampling by the stock keeps the soil compacted, favoring the spread of carpet grass, and close grazing keeps down the taller growing plants which would injure it by shading.

If a field of carpet grass be left ungrazed after October 1 it will grow quite tall. In the protection thus afforded green leaves will appear through much of the winter and furnish winter pasture. The cattle in eating the green leaves consume incidentally many of

the dry leaves which otherwise they would avoid. Such a field must never be burned over, as fire is very destructive to carpet grass.

OTHER GRASSES TO GROW IN MIXTURE WITH CARPET GRASS.

Carpet grass and Bermuda grass rarely grow together for any length of time. As a rule Bermuda grass prevails on clay soils, while carpet grass dominates on sandy soils. On soils that will grow both grasses it is often economy to seed the two in mixture, but eventually one or the other will occupy the land almost exclusively.

Dallis grass (*Paspalum dilatatum*) usually grows well in carpet-grass sod, and it is a good plan to sow seed of this, especially on the better soils, after the carpet grass is well established. Plowing furrows 10 feet apart and sowing the rather expensive Dallis grass seed in the furrows is a good plan.

North of Florida lespedeza, if not already present, should always be added to carpet grass. It succeeds admirably and adds a desirable constituent to the feed.¹

Carolina clover (a native species), yellow hop clover, and rabbit-foot clover (the last two introduced) are desirable legumes. The first comes in naturally and the other two if introduced spread year by year. Commercial seed of these clovers is not on the market.

Bur clover and perhaps black medic are exceedingly desirable legumes to establish in carpet-grass pasture, where the former often succeeds splendidly and results in a 12-months pasture. Success with bur clover is nearly always conditional on securing abundant inoculation.² Black medic on some soil types may be expected to succeed at least as well as bur clover. Augusta vetch is another exceedingly desirable winter legume for carpet-grass pastures. All of the above legumes reseed themselves naturally.

White clover is also a very desirable constituent in carpet-grass pastures, particularly on moist or rich soils. It will make much feed in the cool season, but becomes dormant or semidormant in summer.

Italian rye-grass sown on carpet grass about October 1 under favorable moisture conditions will make much winter grazing. With this grass, however, it is necessary to seed it every season.

Carpet-grass pasture supplemented by the plants mentioned will make an ideal pasture that can be grazed nearly, if not quite, the entire 12 months.

¹ McNair, A. D., and Mercier, W. B. Lespedeza, or Japan clover. U. S. Dept. Agr. Farmers' Bul. 441. 1911.

² Piper, C. V., and McKee, Roland. Bur clover. U. S. Dept. Agr. Farmers' Bul. 693. 1915.

On low or moist soils, particularly near the northern limits of carpet grass, the first seeding of a pasture either on plowed or unplowed land may well be to redtop. The advantages are that the seed is much cheaper and the 1-year-old pasture is an excellent foundation on which to sow carpet-grass seed. Redtop seed in the area referred to must be sown in the fall or early winter. Pure redtop pastures may be expected to persist two or three years. For permanent pastures the addition of carpet grass is imperative.

SEED CROP.

Carpet-grass seed is in much larger demand than supply at present. Unfortunately, there has never been sufficient seed on the market to allow any extensive sowing of this grass. There is no apparent reason why ample seed to supply all needs should not be harvested. Lack of knowledge on the part of those who have the grass in abundance as to the market demand for the seed seems largely responsible for the deficient supply. Those who have open areas of carpet grass of sufficient extent to justify harvesting the seed never have to sow it. On the other hand, in the localities where the seed is most needed the grass does not exist except in small areas.

Perhaps the most promising location for developing the carpet-grass seed industry is on the alluvial lands of the lower Mississippi Valley. In that region cotton growing has been curtailed to some extent because of the boll weevil, and cattle raising has been substituted. Many of these old cotton fields are now thickly set with carpet grass and an abundant seed crop goes to waste every year.

Carpet grass will form a seed crop in spite of pasturing. The stock graze the basal leaves, while the seed stalks are rarely eaten. Perhaps a larger crop of seed may result if all stock is kept off the field for a few weeks while it is going to seed. This is a point on which there are no data and which needs investigation. Meantime the crop of seed which is produced in addition to the pasturing will pay good returns if harvested. An ample supply of carpet-grass seed is at present a great need in southern agriculture.

Carpet grass begins to mature seed in June, but continues to bloom throughout the summer. The main crop of seed and the only one that will usually pay to harvest is ripe early in September. (Fig. 5.) There is a period of a month or six weeks in the fall when seed may be gathered, but there is considerable loss from shattering if the crop is not gathered when it first becomes ripe.



FIG. 5.—Seeds of carpet grass, enlarged. The small figures in the lower left-hand corner are natural size. [Drawn by F. H. Hillman.]

HARVESTING THE SEED.

Carpet-grass seed shatters easily when ripe. The seeds are small and light, being about the size of timothy seed, and not so heavy. The grass should be cut with a mower and handled as little as possible in order to avoid loss from shattering. The straw should be allowed to become thoroughly dry before attempting to separate the seed.

Much seed can be obtained by beating it out of the straw with a flail on a tight floor or on a large canvas. Where there is a considerable area to be harvested a thrashing machine is desirable. Almost any kind of a thrasher will do this work if equipped with proper screens. An ordinary grain thrashing outfit will answer, but it will require more work to clean the seed from the chaff. The chief danger in thrashing will be from too heavy a blast of air, which will blow the seeds out with the straw. The air intakes to the fan should be reduced to the minimum or the fan cut out entirely. Another source of loss is shaking the separating apparatus of the thrashing machine too rapidly. If this action is very violent the seeds, being light in weight, may not fall through the screens, but pass out with the straw.

CLEANING THE SEED.

Good screening will clean carpet-grass seed very satisfactorily. A sieve with a mesh one-twentieth of an inch in size will let the carpet-grass seed through and take out the large weed seeds and coarse material. One with a mesh of one thirty-eighth of an inch will hold the carpet-grass seed and separate the finer material. Hand sieves are sometimes used, but the process is slow and laborious. If much seed is to be cleaned a fanning mill is needed. Manufacturers will gladly advise as to the best combination of screens for cleaning carpet-grass seed with their particular machine if a sample of seed is sent to them. In fanning, the air blast must be light in order to avoid loss of seed.

Carpet-grass seed well cleaned weighs about 18 pounds to the bushel.

